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| Steady-State Equilibrium | Continuous inputs & outputs of energy & matter; the system remains more or less constant; small short term changes to occur |  | Your body temperature starts to rise above 37C because you are walking in the tropical sun and the air temperature is 45C. The sensors in your skin detect that your surface temperature is rising so you start to sweat and go red as blood flow in the capillaries under your skin increases. Your body attempts to loose heat. |
| Static Equilibrium | No change occurs; does not occur in living systems; when change occurs, a NEW equilibrium is found |  | A thermostat in a central heating system is a device that can sense the temperature. It switches a heating system on when the temperature decreases to a predetermined level, and off when it rises to another warmer temperature. So a room, a building, or a piece of industrial plant can be maintained within narrow limits of temperature |
| Stable Equilibrium | A system will return to the same equilibrium after a disturbance |  | Some organisms have internal feedback systems, physiological changes occurring that prevent breeding when population densities are high, promoting breeding when they are low. This maintains the balance of an ecosystem |
| Unstable Equilibrium | After a disturbance, a system will return to a NEW equilibrium |  | The predator-prey model and shows the effect of changing number of prey on predator numbers. When prey populations increase, there is more prey for the predator so they can eat more and breed more, resulting in more predators which eat more prey so the prey numbers decrease. If there are fewer prey, there is less food, and the predator numbers decrease. |
| Positive Feedback | The system is reinforced and strengthened | The movement of material through living organisms (carnivores eating other organism) | In some developing countries poverty causes illness and contributes to poor standards of education. In the absence of knowledge of family planning methods and hygiene, this contributes to population growth and illness, adding further to the causes of poverty |
| The movement of material in a non-living process  (water being carried by a stream) |
| Negative Feedback | The system is dampened, neutralized, or counteracted. This causes the system to self-regulate | The movement of energy (ocean currents transferring heat) | Higher temperatures may cause more evaporation, which leads to more water vapor in the atmosphere. Water vapor is a greenhouse gas so more heat is trapped in the atmosphere which will cause additional warming. |
| Matter to matter (soluble glucose converted to insoluble starch in plants) |
| Transformation  *Of energy & matter* | Flow involves a change of state | Energy to energy  (light converted to heat by radiating surfaces) | You are lost on a high snowy mountain. When you body senses that it is cooling below 37C, various mechanisms such as shivering help rise your body temperature. |
| Matter to energy  (burning fossil fuels) |
| Transfer  *Of energy & matter* | Flow does not involve a change of state, requires less energy | Energy to matter  (photosynthesis) | Since glaciers and ice are white, some sunlight is reflected back into space. Since it is reflected back into space it does not cause the earth to warm. As the earth warms, the ice melts leaving the darkness of the ocean. The dark ocean absorbs more light and reflects less light back into space. As the ice melts more and more ocean is made visible and the more heat that is absorbed. |
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